IN THE CLAIMS

What is claimed is:

1. A composite structure comprising:

a substrate;

an interfacial barrier laminate disposed over the substrate, wherein said interfacial barrier laminate comprises at least one ceramic layer and at least one metallic layer; and

a diamond coating disposed over said interfacial barrier laminate wherein the metallic layer is partially converted into a carbide layer.

2. The composite structure according to claim 1 wherein the interfacial barrier laminate contains an interfacial layer selected from the group consisting of high recrystallization temperature amorphous nitrides, high recrystallization temperature amorphous borides, and high recrystallization temperature amorphous carbides and combinations thereof.

3. The composite structure according to claim 2 wherein the interfacial layer is disposed between said ceramic layer and said substrate.

4. The composite structure according to claim 1 wherein the interfacial barrier laminate comprises an interfacial layer selected from the group consisting of borides, nitrides and carbides of transition metals and combinations thereof.

5. The composite structure according to claim 1 wherein the interfacial barrier laminate comprises an interfacial layer selected from the group consisting of TiC, TiCN, TiAl, TiN, CrN, CrC, ZrN, ZrC, WC, SiC, Si_3N_4 and combinations thereof.

6. The composite structure of claim 5 wherein the interfacial layer is disposed between said ceramic layer and said substrate.

7. The composite structure according to claim 1 wherein the interfacial barrier laminate contains an interfacial layer of Al_20_3.

8. The composite structure of claim 7 wherein the interfacial layer is disposed between said ceramic layer and said substrate.

9. The composite structure according to claim 1 wherein the interfacial barrier laminate contains an interfacial layer selected from a group consisting of Cr, Ti, Zr, W, and Si and combinations thereof.

10. The composite structure according to claim 1 wherein the interfacial barrier laminate is between 2 μm and 15 μm thick.

11. The composite structure according to claim 1 wherein the interfacial barrier laminate is between 5 μm and 10 μm thick.

12. The composite structure according to claim 1 wherein said ceramic layer of said interfacial barrier laminate is between 2 μm and 5 μm thick.

13. The composite structure according to claim 1 wherein said metallic layer of said interfacial barrier laminate is between 2 μm and 7 μm thick.

14. The composite structure according to claim 1 wherein said carbide layer of said metal layer is between 1 μm and 3 μm thick and faces said diamond coating.

15. A composite laminate comprising:

a carbon-sensitive substrate;

an interfacial barrier laminate configured to inhibit the diffusion of carbon; and

a carbide rich coating disposed over said interfacial barrier laminate.

16. The composite laminate according to claim 15 wherein the interfacial barrier laminate comprises an interfacial layer selected from the group consisting of high recrystallization temperature amorphous nitrides, high recrystallization temperature amorphous borides, and high recrystallization temperature amorphous carbides and combinations thereof disposed between said ceramic and said substrate.

17. The composite laminate according to claim 15 wherein the interfacial barrier laminate comprises an interfacial layer selected from the group consisting of boride nitrides and carbides of transition metals and combinations thereof.

18. The composite laminate according to claim 15 wherein the interfacial barrier laminate comprises an interfacial layer disposed between said substrate and said carbide layer selected from the group consisting of TiC, TiCN, TiAl, TiN, CrN, CrC, ZrN, ZrC and combinations thereof.

19. The composite laminate according to claim 15 wherein the interfacial barrier laminate comprises an interfacial layer Al_2O_3 disposed between said substrate and said carbide layer.

20. The composite laminate according to claim 15 wherein the interfacial barrier laminate comprises an interfacial layer selected from the group consisting of Cr, Ti, Zr, Si, W, Ni and combinations thereof disposed between said substrate and said carbide layer .

21. The composite laminate according to claim 15 wherein the interfacial barrier laminate is a metal which forms carbides in the presence of carbon.

22. The composite laminate according to claim 15 wherein the interfacial barrier laminate is between 5 μm and 10 μm.

23. The composite laminate according to claim 15 further comprising a carbon rich coating disposed over the carbide rich coating.

24. The composite laminate according to claim 23 wherein the carbon rich coating comprises diamond.

25. The composite laminate according to claim 15 wherein the substrate comprises steel.

26. The composite laminate according to claim 15 wherein substrate comprises cemented carbide.

27. A cutting tool comprising:

a carbon sensitive substrate;

a ceramic layer disposed over the carbon sensitive substrate configured to inhibit the diffusion of carbon;

a metallic layer disposed over the ceramic layer;

a carbide layer disposed over said metallic layer; and

a diamond layer disposed over said carbide layer.

28. The cutting tool according to claim 27 wherein the carbon sensitive substrate is steel.

29. The cutting tool according to claim 28 wherein steel is heat-treated after the diamond deposition, resulting in a substrate with a martensite structure.

30. The cutting tool according to claim 27 wherein the carbon sensitive substrate is cemented carbide.

31. The cutting tool according to claim 27 comprising an interfacial layer disposed between said substrate and said diamond layer selected from the group consisting of borides, nitrides and carbides of transition materials and combinations thereof.

32. The cutting tool according to claim 27 comprising an interfacial layer selected from the group consisting of TiC, TiCN, TiAl, TiN, CrN, CrC, ZrN, ZrC and combinations thereof disposed between said substrate and said diamond layer.

33. The cutting tool insert according to claim 27 comprising an interfacial layer of Al_2O_3 disposed between said substrate and said diamond layer.

34. The cutting tool according to claim 27 comprising an interfacial layer selected from the group consisting of Cr, Ti, Zr, and Si and combinations thereof disposed between said substrate and said diamond layer.

35. The cutting tool according to claim 27 further comprising a layer of mixed sp2- and sp3-bonded carbon.

36. A method of forming a composite structure comprising the steps of:

providing carbon sensitive substrate;

disposing a layer of ceramic on the substrate;

disposing a layer of metal on the ceramic;

disposing a layer of material containing carbon on the metal under conditions sufficient to convert a portion of the layer of metal into carbide.

37. The method according to claim 36 wherein providing a carbon sensitive substrate is providing one of steel or cemented carbide.

38. The method according to claim 36 further comprising the step of heat treating the composite structure.

39. The method according to claim 36 wherein disposing a layer of metal is disposing a layer of metal between 2 μm and 7 μm thick.

40. The method according to claim 36 wherein disposing a layer of carbon is disposing a layer of material containing carbon such that between 1 μm and 3 μm of metal is converted into carbide.

41. The method according to claim 36 wherein disposing a layer of carbon is disposing a layer of diamond.